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THE BONAVIST, LABLAB, OR HYACINTH BEAN.

By C. V. Piper, *Agrostologist in Charge*, and W. J. Morse, *Scientific Assistant*, *Forage-Crop Investigations*.

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INTRODUCTION.

The bonavist is a native of India and has been cultivated since ancient times. In tropical and subtropical countries it is generally grown for human food, the young pods of some varieties being used after the manner of string beans. In India, China, and, formerly at least, the West Indies, the dried seeds of certain varieties are also used as food. In temperate countries it is more commonly known as an ornamental plant, especially the purple-leaved floriferous varieties, which are often used to grow over trellises or porches. To some extent the bonavist has also been used for forage and as a green-manure crop. Judging from the reports of early writers its use for such purposes in the Southern States was formerly common, but the plant is now rarely used there as a field crop.

CULTURAL CHARACTERISTICS.

In most respects the bonavist is closely comparable to the cowpea, but it is more vigorous and more viny. A single plant of some of the sorts will produce under favorable conditions at least twice as much herbage as a single plant of any cowpea. The stems are tougher and more fibrous and the leaves less succulent. Like the cowpea, the bonavist is indeterminate in growth, blooming and fruit-

ing as long as the conditions remain favorable. The best bushy or half-bushy sorts planted in 3-foot rows make much the same type of growth as the cowpea, and under the same conditions will produce a greater yield of hay, which is more easily cured, owing to its smaller moisture content. The plants are markedly drought resistant, and under the conditions existing at Chillicothe, Tex., suffer less from drought than cowpeas.

The bonavist is also well adapted to planting with corn or some other supporting crop. In corn the vining habit of the plant becomes accentuated, and some of the more vigorous varieties will grow across the rows, making a tangled mass difficult to handle when cutting for silage. On the whole, however, the bonavist is closely comparable to the cowpea in value for planting in corn.

SEED PRODUCTION.

The principal weakness of the bonavist, considered as a forage crop, is the relatively poor yield of seed and the difficulty of harvesting the same, which makes it expensive. From a seed-production standpoint the most desirable varieties are those in which the pod retains its form when dry, as these are not much affected by wet weather and thrash out rather easily.

VARIETAL CHARACTERS.

The bonavist varies in all its parts perhaps more than any other legume, which fact accounts in part for its numerous botanical names. This variation is, moreover, far greater than botanical diagnoses have indicated, so that several varieties answer equally well to some of the brief descriptions. The characters that distinguish varieties in the bonavist may be briefly discussed as follows:

Habit.—Most varieties are very viny, but a few strictly bush sorts occur. The most vigorous kinds will climb on trellises to a height of 20 to 30 feet.

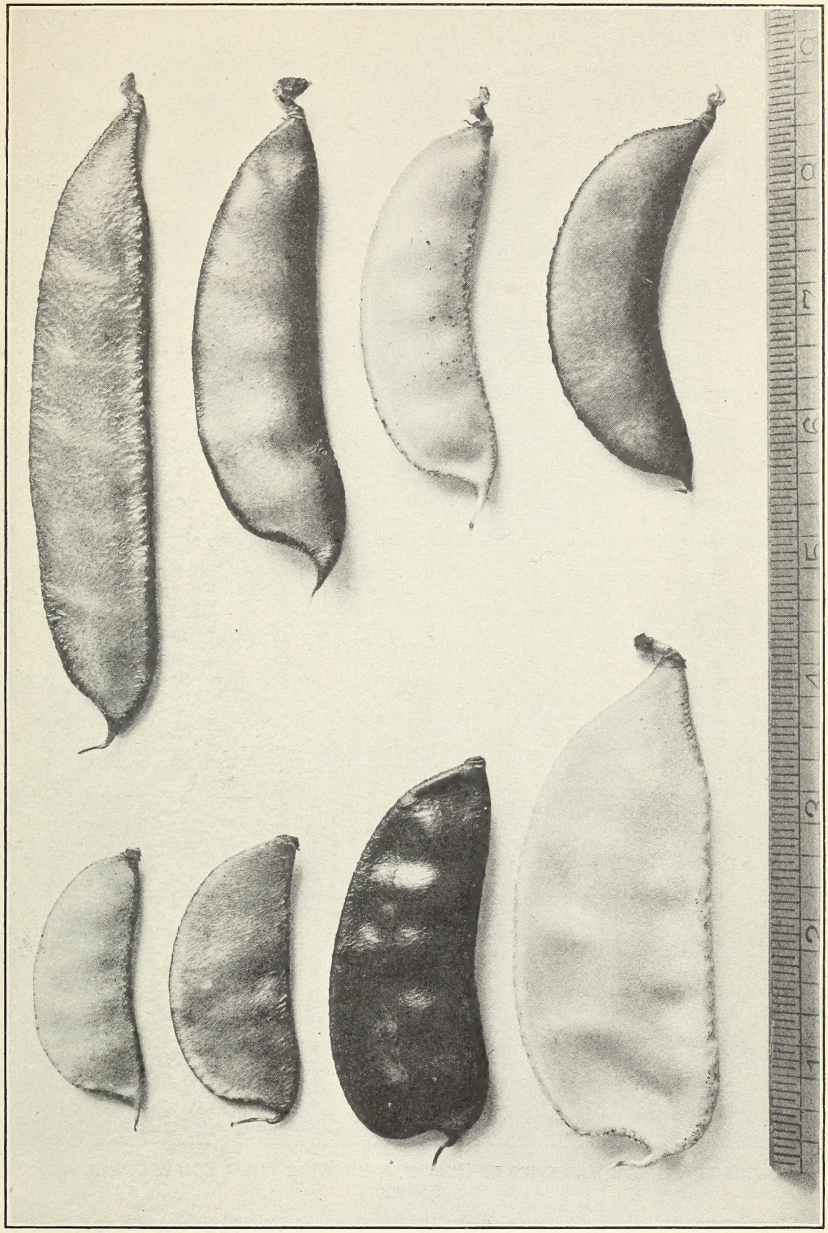
Life period.—At Arlington Farm the earliest varieties ripen their first pods in about 100 days. Many kinds are not even in bloom when killed by frost after about 140 days. The wild plant is said by most writers to be perennial, but the cultivated sorts are annuals. A variety commonly cultivated in the Philippines as a vegetable endures there at least two years, and this is probably a common occurrence with the plant in the Tropics.

Color of herbage.—In some varieties every part of the plant is more or less deeply purple tinged, while in others there is no trace of this color. In a few sorts only the stems, petioles, and principal leaf veins are purple.

Pubescence.—Many varieties are covered with short, white hairs, so that the foliage is pale and dull. Other sorts are bright green and nearly glabrous.

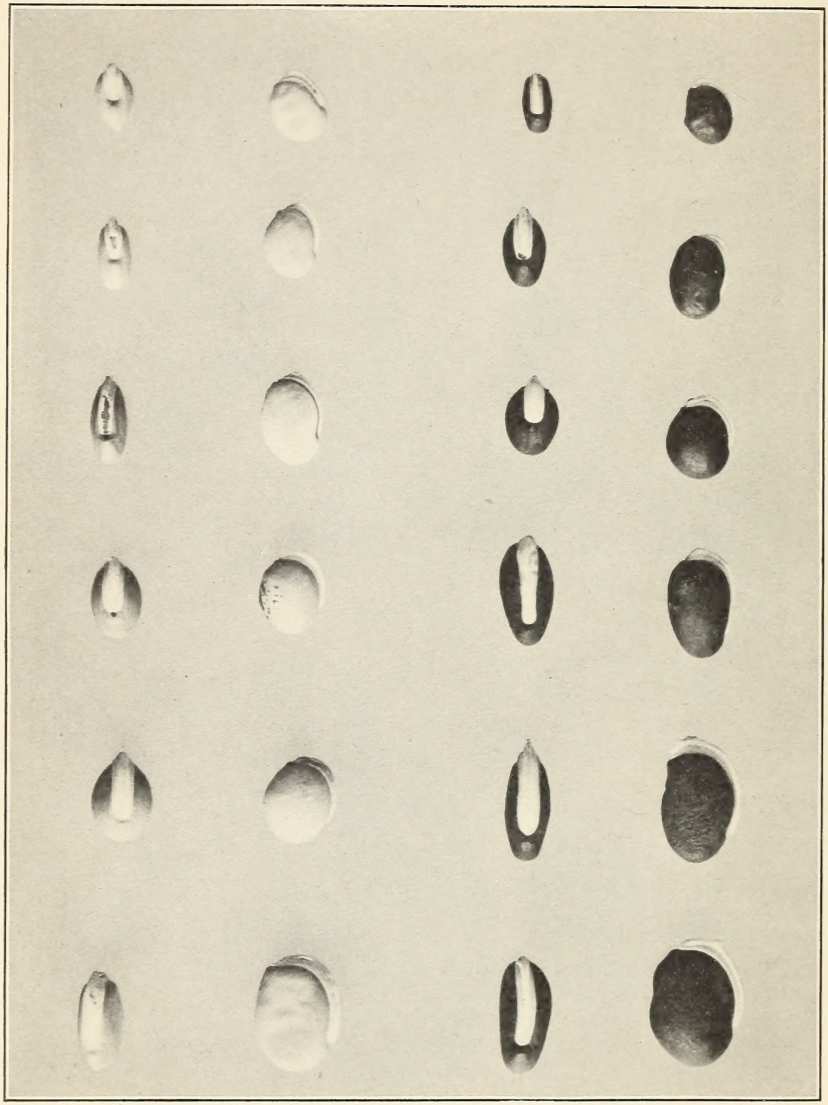
Leaflets.—The leaflets vary considerably in size and color and to a slight degree in shape.

Flowers.—Two colors occur in the flowers, white and pink purple. There are also differences in the size of the corolla and the degree of fragrance. More striking are the differences in the length of the peduncle, the abundance of



FULL-GROWN BUT NOT MATURE PODS OF EIGHT VARIETIES OF BONAVIST.

These beans are listed in the inventories of the Office of Foreign Seed and Plant Introduction as Nos. 8356, 25132, 21998, 17534, 26358, 8686, 27533, and 31363, reading from left to right.



SEEDS OF TWELVE VARIETIES OF BONAVIST, SHOWING THEIR RANGE IN SIZE AND SHAPE.

These beans are listed in the inventories of the Office of Foreign Seed and Plant Introduction as Nos. 25158, 4380, 25157, 27532, 8686, 25132, 21998, 25154, 25915, 8355, 21352, and 25727, reading from left to right.

the flowers, and the size of the panicles. In many sorts the panicles are short peduncled and 10 to 20 flowered, while in the more floriferous kinds the long-stalked panicles are a foot in length and 20 to 30 flowered.

Pods.—The pods vary greatly in size and shape (Pl. I). The color may be green, white, purple, or purple margined. In some of the green-podded sorts the pods are fibrous and retain their shape when fully ripe, but most of the cultivated varieties have more or less fleshy pods, which shrink and become distorted at maturity. The fleshy-podded sorts are the best for use as snap beans.

Seeds.—The seeds vary greatly in size, shape, and color (Pl. II), and furnish along with the pods the easiest characters by which to identify varieties.

Susceptibility to disease.—All of the varieties of the bonavist are remarkably free from leaf diseases. Many, if not all, however, are subject to both Fusarium root-rot and to nematodes.

VALUE FOR HUMAN FOOD.

The green pods of some varieties of the bonavist are much used in the Tropics as snap beans; indeed, they have been called by Roxburgh "the kidney beans of the Asiatics." Other varieties are not thus eaten in India, being called bitter. One variety has for some years been sold by Vilmorin under the name "Stringless" (S. P. I. No. 20447). This produces an abundance of large, fleshy white pods, which, cooked after the manner of string beans, are very good. This variety should be generally grown from Maryland and Kentucky southward, as it not only produces an abundance of edible pods, but incidentally makes an attractive arbor vine.

The use of the dry seeds for food is less common, but some varieties are thus utilized in India and China.

Under some conditions prussic acid is formed in the seeds. Thus Leather (8)[1] found that the poisonous acid was formed when the crushed seeds of the bonavist were allowed to remain in cold water a few hours.

Mr. O. F. Black, chemical biologist of the Office of Drug-Plant, Poisonous-Plant, Physiological, and Fermentation Investigations, who upon request examined seeds of S. P. I. Nos. 8356 (blackish), 22025 (dark purple), and 25156 (cream color), all grown at Arlington Farm in 1913, to see if hydrocyanic acid could be detected, made the following report:

> The dry seeds were ground, suspended in dilute sulphuric acid, and distilled with steam. The distillate was tested for hydrocyanic acid, with negative results in every case.
>
> Nos. 8356 and 22025 were germinated in the greenhouse in sphagnum moss until the roots were 3 to 4 centimeters long and then tested in a similar way, but gave no evidence of the presence of hydrocyanic acid.

[1] The numbers in parentheses refer to "Literature cited," page 15.

BOTANICAL NAMES.

Dolichos lablab is the usual botanical name applied to the bonavist, and apparently this species must be considered the type of the genus Dolichos. By some botanists the bonavist is not considered congeneric with most of the species that have been included in the genus Dolichos. On this account Adanson established the genus Lablab in 1763 (1), which has been accepted by many botanists. Whether one genus be recognized or two, the name Dolichos should be maintained for the bonavist, as this clearly stands for Linnæus's idea of the genus.

Dolichos lablab was so named in 1753 by Linnæus (10), who based it primarily on an Egyptian plant described and figured by Alpino (2). Lablab, or liblab, is the Egyptian name. Alpino describes the seeds as black or dark reddish, but does not state the color of the flowers. Later writers seem to have overlooked the fact that the species is based on Alpino's Egyptian plant. De Candolle (3, p. 401) calls the black-seeded Egyptian plant *Lablab vulgaris niger*. Schweinfurth and Muschler (13) name a purple-flowered Egyptian variety *Dolichos lablab* var. *hortensis*, but this is not unlikely the same as that originally described by Alpino.

Linnæus (11, p. 1021) later described as a species *Dolichos purpureus*, based on a plant from the Indies with flowers, stems, petioles, and leaf veins purple. This name as used by later botanists has usually been considered a variety of *Dolichos lablab* and has been applied to any sort that had the foliage more or less purple tinged.

Dolichos benghalensis Jacquin (6) represents a variety of bonavist from Bengal with white flowers, white, fleshy, falcate pods, and reddish purple seeds. It is very similar to S. P. I. No. 25154. De Candolle (3, p. 401) renamed Jacquin's plant *Lablab vulgaris* var. *albiflorus*.

Dolichos albus Loureiro (12), from Cochin China and China, is based on a sort with white flowers and pubescent leaves, but the color of the seeds is not stated.

Lablab perennans De Candolle (3, p. 402) is based on Loureiro's (12) description of *Dolichos albus*. De Candolle says that the seeds are white. Loureiro, as well as De Candolle, cites also plate 137 of Rumphius (16), illustrating a plant which is described as having white flowers, white seeds, and pods broadest toward the apex, as shown by the drawing.

Dolichos cultratus Thunberg (19) is based on one of the varieties grown in Japan. The color of the flowers and seeds is not given, but the pods are acinaciform; that is, broadest toward the apex.

Lablab nankinicus Savi (17, p. 119), as described by Savi, is a variety with white flowers, ovate, turgid white seeds, and short, firm-

walled acinaciform pods, which open easily. The description is detailed, and the author evidently grew the plant he describes. Savi identifies with his species a variety from Egypt described by Alpino; one cultivated in Japan, but originally from Nankin, China, described by Kaempfer; one from Jamaica described by Sloane; and one from Jamaica and Barbados described by Plukenet. It is hardly likely that all of these are the same variety, even if they agree in the diagnostic characters set forth by Savi.

Lablab leucocarpos Savi (17, p. 120) is described as having white flowers, subglobose, black or reddish black seeds, and white, fleshy, acinaciform pods, which shrink in drying. The long, detailed description suggests a variety very similar to, if not identical with, S. P. I. No. 31363. The source of the variety is not stated, but Savi received the seed under the name *Dolichos lablab* siliqua eduli, that is, *Dolichos lablab* with edible pods.

Lablab microcarpus De Candolle (3, p. 402) is based on the plant described and figured by Rumphius (16, p. 390, pl. 141, fig. 1) under the name *Cacara litorea.* It is a seashore plant, apparently a species of Canavalia near to *C. turgida.*

Dolichos lignosus Linnæus (10) is probably distinct from the bonavist, but there is much difference of opinion among botanists as to the actual identity of the plant. Linnæus's original description and figure of *Dolichos lignosus* (9) were based on a plant, supposedly from America, that bloomed but did not fruit in Clifford's garden in Holland. It is described as perennial, woody stemmed, and with red or purple flowers. The figure shows a plant much like the bonavist, but with smaller leaflets. Linæus also cites as identical with his plant "*Phaseolus indicus perennis*, floribus purpurascentibus. Hort. Carolsrh. 36."

In 1753, when Linnæus (10) gave the name *Dolichos lignosus* to the plant he had described in 1737 (9), he modified his description by stating that the pods were strictly linear and that the habitat of the plant was unknown. Inasmuch as the original plant of *lignosus* in Clifford's garden did not produce pods, it would be a matter of interest to determine on what basis Linnæus decided 16 years later that they were strictly linear.

In 1763 Linnæus (11, p. 1022) repeats his description made in 1753 (10), but adds as a synonym, "Cacara s. Phaseolus perennis Rumph. Amb. 5, p. 378, t. 136," and "Habitat in India."

Rumphius (16, pl. 136) shows a plant, clearly the bonavist, with the immature pods nearly straight and of about the same width at base and apex, very similar to S. P. I. No. 21998 (Pl. I).

It is from this figure of Rumphius that most later writers have interpreted *Dolichos lignosus.* Rumphius's figure, however, differs

from Linnæus's original illustration (9) considerably, and one may seriously doubt whether it is the same species.

Two other illustrations of *Dolichos lignosus*, both colored, resemble Linnæus's original much more closely, namely, Smith's (18) and Curtis's (4). Each of these illustrations depicts a plant with red flowers and with small leaflets, as in Linnæus's illustration (9). The plant of Smith shows the leaflets acuminate, not acute, as drawn by Linnæus and by Curtis. Smith says the mature pods are "an inch long, a little recurved, brownish, smooth." None of these three illustrations agrees with any of the 60 varieties of the bonavist grown at Arlington Farm, and they may well represent another species. Indeed, Smith's plant may be distinct from that of Curtis. The latter was considered a new species by Don (5), who named it *Dolichos curtisii*. Smith's plant may perhaps be *Dolichos jacquinii* DC.

The opinions of many later botanists who did not have much first-hand knowledge on which to decide whether *lignosus* was really a different species from *lablab* may be disregarded. The opinions of botanists who studied the flora of India are, however, entitled to greater weight, inasmuch as both species are supposed to be from that region.

Roxburgh (15) differentiates *Dolichos lablab* from *D. lignosus* as follows:

> Legumes horizontal, compressed, semilunar, with a straight scabrous back ending in a straight, daggered point---*lablab*.
>
> Legumes linear, oblong, slightly incurved, torulose, both margins turned and rugose, with a subulate, recurved apex----------*lignosus*.

Of the former, Roxburgh cites seven varieties, with three of which he identifies plates 136, 137, and 141 of Rumphius (16). Of the latter, he lists six varieties, with one of which he regards plate 25 in Kaempfer as identical.

Plate 136 of Rumphius (16) has already been referred to.

Plate 137 gives an oblique view of full-grown pods that apparently are oblong, but probably are broadest toward the apex, as in ordinary varieties of the bonavist.

Plate 141 is clearly a species of Canavalia.

Plate 25 of Kaempfer (7) has the immature pods falcate, while the mature ones are nearly straight and not broader toward the apex; in other words, they are linear and not different in form from those on plate 136 of Rumphius (16), except that the tip is incurved. Judging from the plates cited, Roxburgh seems to have given great weight to the form of the tip of the pod, but this character is of little significance. In our opinion, plates 136 and 137 of Rumphius (16), as well as plate 25 of Kaempfer (7), all clearly represent the

bonavist. The pod forms depicted show much less divergence from one another than in undoubted varieties of bonavist grown at Arlington Farm.

Prain (14) thinks that Roxburgh reversed the incidence of the Linnæan names, partly because he cites plate 136 of Rumphius (16) as representing *Dolichos lablab*, when as a matter of fact the same plate is cited as *D. lignosus* by Linnæus in 1763 (11, p. 1022).

Prain further states that the two can be distinguished by the following characters:

Dolichos lablab L. Pods longer, more tapering at point; seeds with long axis parallel to sutures.

Dolichos lignosus L. Pods shorter, more abruptly truncated at end; seeds with long axis at right angles to sutures.

On the basis of these pod characters, S. P. I. Nos. 8356, 25132, 21998, and 17534 would be *Dolichos lablab* and 27533 and 31363 would be *D. lignosus* (compare Plate I), but in all these varieties the long axis of the seeds is at right angles to the sutures. If the description of Prain (14) of the position of the seeds is correct in what is designated as *D. lablab*, then all of the plants tested in our studies are *D. lignosus.*

On the whole, the writers incline to the view that two species can not be differentiated on the basis of the characters ascribed by Roxburgh (15) and by Prain (14). It seems doubtful, indeed, whether any of the varieties discussed by these botanists represents the *Dolichos lignosus* of Linnæus.

The plant cultivated as an ornamental in California under the name *Dolichos lignosus* is in reality *Dolichos jacquinii* DC.

NOTES ON THE INTRODUCTION NUMBERS OF DOLICHOS LABLAB.

The following notes refer to the various introductions of *Dolichos lablab* made by the Office of Foreign Seed and Plant Introduction from 1899 to 1913.

The 95 lots here enumerated represent at least 50 varieties, judging partly by the seeds. At Arlington Farm, Va., 57 lots representing 39 varieties were grown from one to four seasons, and full comparative field notes of these were secured. Twenty-five of these are early enough to mature and two to blossom. Twelve are so late that they had not even formed buds before they were killed by frost.

2083. From Paris, France, 1899. See No. 20447.

2882. From Wuchang, China, 1899. No data preserved.

3286. From Algeria, 1899. Chinese white-flowered No. 1. Seeds apparently identical with No. 20447.

3287. From Algeria, 1899. Chinese white-flowered No. 2. Seeds quite the same as No. 3286.

3288. From Algeria, 1899. Chinese white-flowered No. 4. Seeds indistinguishable from No. 3286. Apparently all three are the same as No. 20447.

3597. From Smyrna, 1899, under the name "Saliakakia." Seeds dark red with black spots. No cultural notes.

4378. From Naples, Italy, 1900, erroneously labeled *Pachyrhizus tuberosus*. Seeds dark reddish, just like No. 5040.

4380. From Naples, Italy, 1900. Probably the same as No. 20447.

4383. From Naples, Italy, 1900, under the name *Dolichos atropurpureus*. This is a bushy variety of only medium vigor, when planted in rows growing to a height of 18 to 24 inches, with vining branches 3 to 4 feet long; herbage dark purple; flowers numerous, in erect panicles; pods dark purple, broad, 1.5 inches long, somewhat fleshy, the first maturing in about 100 days; seeds small, dark purple to nearly black. This variety is quite ornamental in its purple foliage, and is apparently identical with the colored plate of *Dolichos purpureus* L. in the Botanical Register, vol. 10, plate 830. At Arlington Farm it readily volunteers year after year where once planted.

4384. Received from Naples, Italy, 1900, under the name *Dolichos sempervirens*. A viny variety making a dense mass of herbage 3 feet deep; stems purple; leaflets green; flowers purple, on short peduncles; immature pods green, broad, 1.5 inches long, the first maturing in 100 days; seeds compressed, small, varying from dark purple to nearly black.

For forage purposes this variety is one of the most satisfactory, on account of its vigorous growth, bushy habit, and the abundance of pods which it produces. These pods are not fleshy, and they mature without shrinking. This variety volunteers more abundantly than any other. No. 25160, from a stray plant at Arlington Farm, differs only in the color of the seeds, these being reddish with black marblings. No. 22025, also the progeny of a stray plant, is identical with No. 4384.

5040. From Naples, Italy, 1900, erroneously labeled *Pachyrhizus tuberosus*. Seeds identical with No. 4378. Notes insufficient, but plants were too late to bloom at Arlington Farm.

5070. From Hawaii, 1900, but originally from Australia under the name "tongan bean." Seeds large, nearly black, with a few buff specks. No cultural notes preserved.

5402. From Calcutta, India, 1900, erroneously labeled *Canavalia virosa*. Seeds large, black. No cultural data.

5412. From the Royal Botanic Gardens, Calcutta, 1900, under the name *Dolichos lablab falcatum majus*. Seeds black purple, medium sized. No cultural data.

5413. From same source as preceding, under the name *Dolichos lablab falcatum minus*. Seeds medium sized, dark purple. No cultural notes.

5414. From same source as No. 5412, under the name *Dolichos lablab purpurascens*. Seeds dark reddish purple. No cultural notes.

5519. From Lombok, Dutch East Indies, 1900, under the name "Katjang ussi." Seeds large, black purple. No cultural notes.

6319. From Tokyo, Japan, 1901. Seeds red purple, indistinguishable from No. 20447. No field notes.

6320. From Tokyo, Japan, 1901. Seeds dark purple, medium sized. No cultural notes.

6377. Progeny of No. 2083.

6569. From China, 1901. Seeds black purple. No field notes.

8258. From Nice, France, 1902. No further data.

8355. From Morioka, Japan, 1902. A vigorous variety, the plants in 3-foot rows growing 24 inches high and 30 inches broad; stem and petioles purplish; leaflets green; flowers purple; pods falcate, broadest at apex, 4 inches long, fleshy, green with purple margins, the first maturing in about 120 days; seeds purple black. Very similar to No. 31716, but the pods are broader and the seeds somewhat larger.

8356. From Morioka, Japan, 1902. Rather viny, the plants growing to a height of 24 to 30 inches and making a solid mass; stems and branches purple; leaflets green, but purple veined; flowers purple, numerous, on short, erect peduncles; immature pods falcate, somewhat fleshy, reddish purple, 4½ inches long, shrinking irregularly at maturity, the first ripening in about 115 days; seeds large, plump, nearly black. One of the most ornamental sorts. No. 25155, from Shanghai, China, is not distinguishable.

8357. From the same source as the preceding, with which it proved to be identical.

8545. From Nagpur, India, 1902. No cultural data. Seeds like No. 8686.

8686. From Surat, India, 1902. Half bushy when planted in 3-foot rows, growing to a height of 30 inches; herbage pale green, somewhat hairy; flowers white, on short peduncles; pods green at first, broad, 2 inches long, the first maturing in 110 days; seeds rather small, compressed; nearly white, excepting the micropyle and the strophiole, which are purple.

Identical with this is No. 28032, from Poona, India, received under the name of "kadra wal." Nos. 8545 and 13373 from Nagpur, India, have identical seeds and are probably the same variety.

9431. From Nice, France, 1903. No notes or specimens of this number.

13373. From Nagpur, India, 1903. Seeds identical with No. 8686.

13374. From United Provinces of Agra and Oudh, India, 1903. Seeds identical with No. 8686.

13376. From Bombay, India, 1903, under the name "val." Notes insufficient.

17534. Progeny of No. 4383.

17884. From Peking, China, 1906. Plants very viny, 20 inches high, 40 inches broad; stems and petioles purple; leaflets green, purple veined; flowers purple, on short, erect peduncles; pods falcate, 4 inches long, green with purple margins, somewhat fleshy, the first maturing in about 115 days; seeds black purple. Very similar to No. 31716, but apparently a little later.

17885. From Hawai-jou, China, 1906. Seeds black purple or somewhat spotted. Cultural notes insufficient.

18448. From Shanghai, China, 1906. Seeds identical with No. 21998, but none germinated.

18746. From the Bahamas, 1906. Seeds dark brown; flowers purple. No cultural notes.

18747. From the Bahamas, 1906. Seeds white; flowers white. No cultural data.

20447. "Stringless," from Vilmorin-Andrieux & Cie., Paris, France. A vigorous, very viny sort when planted in 3-foot rows, making a solid mass of herbage 30 inches deep; herbage green; leaflets large; flowers rather large, white, in compact panicles, on short peduncles; immature pods

20447—Continued.

very flat, broad, 4 inches long, fleshy, white, shrinking in maturing, the first ripe in 110 days. Seeds large, plump, reddish purple in color.

Other lots from the same source are Nos. 2083, 6377, 25256, and 31363. No. 4380, from Naples, is seemingly the same variety, judging from the seeds and the brief notes recorded.

The green pods of this variety make a most excellent vegetable, very similar to snap beans, but even more delicate in flavor. This variety should be grown largely as an arbor vine, as it is not only ornamental, but also produces an abundance of delicious beans.

A number of other lots introduced, concerning which no notes have been preserved, but which have similar seeds, are Nos. 3286, 3287, and 3288, from Algeria, received under the name "Madagascar bean"; No. 6319, from Tokyo, Japan; and Nos. 25727 and 25728, from Baroda, India.

20891. From Kobe, Japan, 1907, under the name "fujimame." A vigorous variety with green foliage; flowers white; pods white, somewhat fleshy, the first maturing in about 120 days; seeds large, plump, dark purple. This variety closely resembles No. 25158, but that has cream-colored, much smaller seeds.

21352. From Teyhampett, Madras, India, 1907. A very viny sort, which sprawls on the ground; herbage green; late, no flowers being produced at Arlington Farm after 130 days; seeds cream color, quite large, much compressed, distinct from any other sort with cream-colored seeds received.

21947. From Buitenzorg, Java, 1908, under the name "katjang ieda." A moderately vigorous, late, viny variety; stems purple; leaflets green; flowers pale purple; no pods maturing at the end of 130 days; seeds medium sized, dark purple to black, somewhat compressed.

21948. From Buitenzorg, Java, 1908, under the name "katjang ypit." A vigorous late variety, barely coming into bloom at Arlington Farm in 130 days; flowers pink purple; no pods formed; seeds medium sized, rather plump, dark reddish purple.

21949. From Buitenzorg, Java, 1908, under the name "katjang idjo." A very late purple-stemmed variety that did not bloom at Arlington in 1908. Seeds medium sized, purple black.

21950. From Buitenzorg, Java, 1908, under the name "katjang ypit poetih." Very similar to the preceding when grown side by side. Seeds indistinguishable.

21998. From Boshan, Shantung, China, 1908. An early, not very vigorous variety; plants growing about 30 inches high and as broad, rather bushy, a few of the branches vining to a length of 3 or 4 feet; foliage green; flowers white, on long, stout peduncles; immature pods somewhat fleshy, pale, 2.5 inches long, shrinking and becoming somewhat distorted when maturing, the first pod ripening in about 100 days; seeds subglobose, cream colored, with the micropyle, the strophiole, and a few spots on the back purple.

Apparently identical with this are Nos. 25152 and 25153, both from Shanghai, China. No. 18448, from Shanghai, China, has identical seeds, but these did not germinate.

22025. Progeny of a stray plant, Arlington Farm, identical with No. 4384.

22934. From Karlsruhe, Germany, 1908. A slender, sprawling variety, with green stems and leaves; flowers purple, the first pods maturing in about 110 days; seeds small, dark purple to black.

23215. From Tangsi, China, 1908. A very late, viny variety, which barely comes to bloom in 130 days; herbage green; flowers white; seeds subglobose, entirely cream colored.

Apparently identical with this variety are No. 25440, from Yachow, China, where it is called "beh pien dou," and No. 24912, from Herradura, Cuba. No. 25915, from Hangchow, China, has identical seeds, but these did not germinate.

23329. From Canton, China, 1908. Seeds cream colored; flowers white. Grown only one season; notes too brief for identification.

23330. From Canton, China, 1908. Seeds dark red purple; did not germinate.

23953 to 23956. From Peking, China, 1908. Seeds of No. 23953, black purple; of No. 23954, dark reddish; of No. 23955, red; of No. 23956, cream colored, identical with those of No. 27195. No cultural notes were obtained from these four lots.

24912. From Herradura, Cuba, 1909. This variety proved indistinguishable from No. 23215.

24913. From the same source as the preceding. Very viny and late, not blooming at Arlington Farm in 1909. Seeds reddish chestnut, rather small.

24914. From the same source as the preceding. In habit and maturity not different from No. 24913, but seeds large, plump, and nearly black.

25018. From Khartum, Egyptian Sudan, 1909. A very late, vigorous variety, not blooming at Arlington Farm in 1909. Seeds medium sized, compressed, varying in color from dark purple to nearly black.

25132. From Soochow, China, 1909. A vigorous variety, producing a dense mass of herbage 2½ feet deep; stems and petioles purple; leaflets green with purple veins; blossoms numerous, purple, and in large, erect panicles; immature pods falcate, flattened, green with purple margins, 3 inches long, the first maturing in about 130 days; seeds medium sized, subglobose, black. This variety has foliage and pods very similar to No. 17884, but is later.

25152 and 25153. From Shanghai, China, 1907. Both proved to be identical with No. 21998.

25154. From Shanghai, China, 1907. Not very vigorous; herbage green; flowers pale purple; pods falcate, white, somewhat fleshy, shrinking when dry, barely maturing in 130 days; seeds plump, dark purple. This variety agrees very closely with Jacquin's illustration of *Dolichos benghalensis* in Hortus Botanicus Vindobonensis (6).

25155. From Shanghai, China. Grown in 1908 and 1909. Identical with No. 8356.

25156. From J. M. Thorburn & Co., New York, 1906. Very similar in growth, appearance, and maturity to No. 25157. Seeds slightly larger, more compressed, and cream colored except for a purple line at the margin of the hilum. Identical with this variety is No. 27531, from Naples, Italy, received as *Dolichos lablab* var. *albus*.

25157. From British Guiana, 1907. Half bushy, when planted in 3-foot rows, making a solid mass 36 inches deep; branches 3 to 5 feet long; herbage wholly green; flowers white, on short peduncles; immature pods green, not fleshy, broad, 1.5 to 2 inches long, not shrinking at maturity, the first pod ripening in about 115 days; seeds very small, somewhat compressed, entirely cream colored.

25158. From Barbados, 1908. Bushy, not at all vining when planted in 3-foot rows, each plant about 30 inches high and as broad; herbage green; flowers white, on short peduncles; very fruitful; the immature pods

25158—Continued.
fleshy, white, not distorted when dry, falcate, 2 to 2¼ inches long, only one-half inch wide, straw colored; seeds very small, entirely cream colored, the first maturing in 100 days. Seeds very similar to No. 25157, but pods very different.

25159. From a stray plant at Arlington Farm of unknown origin, 1907. A moderately vigorous variety, producing a mass of herbage 2½ feet deep and as broad; leaves green; flowers on rather stout peduncles; immature pods white and somewhat fleshy, the first maturing in about 100 days; seeds rather small, plump, reddish purple.

25160. Same source as the preceding. Identical in all respects with No. 4384.

25256. From Paris, France, 1909. Identical with No. 20447 in all respects.

25440. From Yachow, China, 1909. Seeds indistinguishable from No. 23215, and the field notes indicate no difference.

25648. From Yachow, China, 1909. Very viny, the branches 6 feet long or more, sprawling, stems purple; leaflets purple veined; flowers purple, on very short peduncles; pods falcate, fleshy, green, with purple margins, 3 inches long, shrinking much in drying; barely maturing in 120 days; seeds purple black, medium sized, plump. This resembles both Nos. 8356 and 31716, but is distinct from both.

25648. Mixed with the preceding. A bushy variety, 2½ feet high; stems and foliage green; flowers white, on short peduncles; pods whitish, fleshy, becoming slightly distorted when dry, 3 inches long, the first maturing in about 120 days; seeds large, plump, black.

25726 to 25728. From Baroda, India, 1909. Seeds of No. 25726, black purple; of Nos. 25727 and 25728, dark purple. No cultural notes for these numbers. The seeds of the first two closely resemble No. 20447.

25915. From Hangchow, China, 1909. Seeds cream colored, quite like those of No. 23215. None of them germinated.

26358. From Malkapur, Berar, India, 1909. Bushy in habit, growing to a height of 3½ feet, forming a dense mass; stems green; leaves whitish, owing to the pubescence; flowers white, on short peduncles; young pods green, broad, 2¾ inches long, not shrinking, the first maturing in about 110 days; seeds small, much compressed, tan colored.

27195. From Shanghai, China, 1910. Somewhat bushy when planted in 3-foot rows, forming a solid mass 3 feet deep; herbage green; flowers white; immature pods green, somewhat fleshy, the first maturing in about 140 days; seeds plump, subglobose, cream colored except for the micropyle and strophiole, which are purple. The seeds of this variety resemble very closely No. 21998, but lack the purple spots on the back. The pods, too, are quite different, and the plant is considerably later. No. 23956, from Peking, China, has identical seeds, but no field notes concerning this number are at hand.

27531. From Naples, Italy, 1910. This has proved to be indistinguishable from No. 25156.

27532. From Naples, Italy, 1910, under the name of *Dolichos lablab* var. *atropurpureus*. Stems purple; flowers purple; seeds just like No. 4384, with which it is probably identical, judging from insufficient notes.

27533. From Naples, Italy, 1910. A very viny variety, producing a mass of herbage 2 feet deep and vines 6 to 8 feet long; stems and petioles purple; leaves dark green, purple veined; flowers purple, on short, erect peduncles; pods bright, shiny purple, broad, 2½ inches long, slightly fleshy but retaining their form when dry, the first maturing in

27533—Continued.
about 110 days; seeds medium sized, plump, dark purple to nearly black. This variety is exceedingly ornamental, especially in its bright purple pods.

27678. From Goa, India, 1910. No field notes. Seeds large, dark purple to nearly black, very similar to those of No. 27533.

27882. From Malkapur, Berar, India, 1910. No cultural data and no seeds preserved.

27883. From same source as preceding. Very viny, but too late to bloom at Arlington in 1910. No seeds preserved.

28032. From Poona, India, 1910. Plants vigorous, rows becoming 3 feet high and 40 inches broad; herbage green, pale, with short pubescence; flowers white, in a small panicle; pods green, not shrinking when dry, broad, compressed, 2 inches long, the first maturing in 120 days; seeds small, somewhat compressed, cream colored, with a purple margin about the hilum and a purple spot on the micropyle and on the strophiole. Very similar in all respects to No. 8686, but larger and later.

28033. From Poona, India, 1910. A very viny, very late variety that did not bloom at Arlington Farm in 1910 in 126 days. Seeds cream colored, with the micropyle and the strophiole purple.

28736. From Nairobi, British East Africa, 1910. A very vigorous late variety, with green herbage, not blooming at Arlington Farm in 1913. Seeds large, plump, reddish chestnut.

31363. From Paris, France, 1911. Same as No. 20447.

31716. From the Philippine Islands, 1911, where it is called "batao." An early variety, when planted in 3-foot rows making a mass of herbage 18 to 22 inches deep; stems and petioles purple; leaflets green, with purple veins; flowers purple, in short, erect panicles; immature pods, 4 inches long, green, with purple margins, falcate, somewhat fleshy, the first maturing in about 110 days; seeds large, mostly black, but some of them reddish, marbled with black.

This variety is commonly grown in Philippine villages as a vegetable. At the Lamao Experiment Farm, near Manila, the vines persist for two years. This closely resembles Nos. 8355 and 17884, but all three are different.

31729. From Canton, China, 1911. Seeds subglobose, entirely cream colored. No field notes.

32610. From Trichinopoly, India, 1911. Very vigorous and viny, but not blooming at Arlington Farm in 1913. In growth and appearance, as well as in seed characters, indistinguishable from No. 35352.

34106. From Pacasmayo, Peru, 1912, under the name "yuna bean." A very vigorous late variety, producing a mass of herbage 3½ feet deep when planted in 3-foot rows; herbage green; leaflets very large; very late, not blooming in 130 days; seeds entirely cream colored, medium sized, different from any other lot received.

34501. From Seharunpur, India, 1912, under the name "makhan sem." A very viny variety when planted in 3-foot rows, making a mass of herbage 2 to 2½ feet high; foliage green; flowers white, large, on long, stout peduncles; pods falcate, fleshy, white when immature, 3½ inches long, none maturing in 120 days; seeds reddish brown.

35351. From Bangalore, India, 1913. In habit and general behavior indistinguishable from No. 34106, but the seeds are different, being quite like those of No. 27195.

35352. From Bangalore, India, 1913. Indistinguishable in growth and maturity from No. 35351. Seeds medium sized, cream colored, with a purple spot at each end of the hilum.

35353. From Mysore, India, 1913. In appearance and maturity not distinguishable from No. 34106, but the medium-sized seeds are not compressed and are reddish chestnut in color.

35354. From Bangalore, India, 1913. In growth and maturity not different from No. 34106. Seeds subglobose, buff colored, medium sized.

02126. From Matamma, Egypt, 1914. A very vigorous viny variety, making a row mass 30 inches deep and 4 to 5 feet broad; herbage entirely green; flowers white, rather small; panicles 8 to 12 inches long, pyramidal, many flowered; pods (immature) falcate, 3 inches long, one-half inch broad, half fleshy, green when fully grown but not mature; seeds small, purple, rather plump; very late, not maturing in 130 days.

This is the only variety secured from Egypt, where the bonavist was first described. This variety does not answer to that originally described by Alpino, nor to the variety *hortensis* described by Schweinfurth and Muschler.

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